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Forests and economic development

Forests and economic development

Report of the Secretary-General

Summary

The present report provides an overview of the key issues related to forests and economic development. It highlights the economic contributions of forests, cross-sectoral linkages, and demographic, climatic, economic trends affecting the future of forests. The report emphasizes that the material/cash benefits of forests generally tend to be better recognized, while the non-cash contributions of forests, including non-wood forest products, ecosystem services, tourism, and cultural benefits are largely unaccounted for. It identifies data gaps and absence of reliable information as being major challenges in estimating the full extent of the economic contributions of forests to economic development. At the same time, the report highlights opportunities for enhancing forests' contributions including through a landscape approach to land-use planning, promoting the role of landscape restoration including the role of trees outside of forests, and advances in information and communications technologies that can contribute to strengthening the knowledge base for forests and economic development.

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Contents

		Page
I.	Introduction	3
II.	Forests and economic development	3
	A. Cash/monetized contributions	4
	B. Non-cash contributions	5
	C. Employment	6
	D. Forests in rural development as pathways out of poverty	7
III.	Cross-sectoral linkages	8
	A. Forests and agriculture	8
	B. Forests and water	9
	C. Forests and energy	9
	D. Forests and transport	10
	E. Forests and mining	11
	F. Forests and health	12
IV.	Key trends affecting the future of forests	12
	A. Global economic growth	13
	B. Demographic changes	14
	C. Urbanization	14
	D. Food security	15
	E. Forests and climate change	15
	F. Forests and natural disasters	17
	G. Competing pressures	17
V.	Challenges in enhancing economic contributions of forests	18
VI.	Key opportunities for forests and economic development	19
	A. A landscape approach to land-use planning	19
	B. Restoration: the role of trees outside of forests	20
	C. Information and data management	21

I. Introduction

1. For millenniums, forests have provided land for settlement and cultivation, construction materials, fuel, food and nutrition. Much of the spread of the agricultural revolution depended on the conversion of forests into cultivable land. Forests have played a major role to influence patterns of economic development, support livelihoods and promote sustainable growth, in many countries.

2. Forests cover nearly 31 per cent of the global land area, approximately 4 billion hectares. According to estimates by the Food and Agriculture Organization of the United Nations (FAO), the forestry sector's contribution from roundwood production, wood processing and pulp and paper to GDP is nearly $468 billion annually.[1] Close to 60 million people are employed by forestry-based industries (wood, pulp and paper and other processing plants).[2] Forests provide significant subsistence benefits, generate informal work opportunities, and constitute reservoirs of economic values that help mitigate shocks to household incomes, particularly for the rural poor.

3. The present report has been prepared as a background paper to facilitate discussions during the tenth session of the United Nations Forum on Forests on the theme "Forests and economic development" and provides an overview of the key issues related to forests and economic development. The report has benefited from analysis in three background studies on forests and economic development commissioned by the secretariat of the United Nations Forum on Forests.[3] The conclusions and recommendation pertaining to this theme are contained in the report of the Secretary-General on conclusions and recommendations for addressing key challenges of forests and economic development (E/CN.18/2013/5).

II. Forests and economic development

4. Forests' contributions to economic development show many different patterns of transition across the globe. The basic pattern shows deforestation in conjunction with initial economic growth, followed by a phase during which forest area and cover stabilize, and then slowly begin to recover as secondary forests (see figure 1). The specific reasons for this pattern differ, from changes in the distribution of economic activities from agriculture to industry to service sectors, in other cases owing to government policies aiming to improve forest cover or penalizing illegal extraction, and in yet other cases as a result of the role of international capital and trade. Under all these patterns of loss, stabilization and recovery, the single constant is the significant contribution of forests to international trade, national economies, employment, direct consumption and household incomes, as well as other environmental and social contributions to nations and their people.

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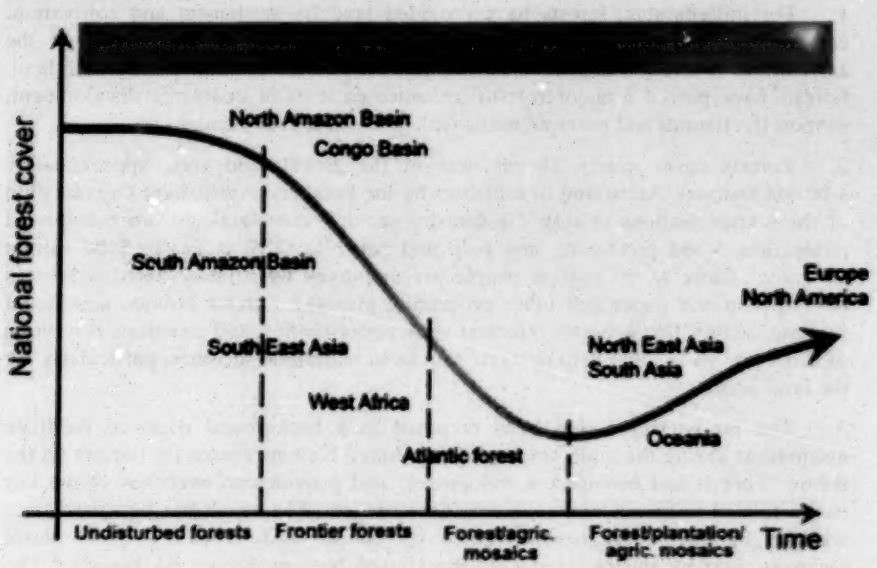
[1] Food and Agriculture Organization of the United Nations (FAO), *State of the World's Forests 2011*.

[2] William V. Street and Sarah Price (2009) "The Forests Dialogue Review: Advancing Poverty Reduction and Rural Livelihoods through Sustainable Commercial Forestry" (Yale School of Forestry and Environmental Studies, New Haven, Connecticut, 2009).

[3] Arun Agrawal and others "Economic contributions of forests"; Uma Lele and others "Changing roles of forests and their cross-sectoral linkages in the course of economic development"; and Arun Agrawal and others "Changing futures, choices and contributions of forests" (all to be published in 2013).

Figure 1
Forest transition curve



Source: Hans Gregersen, Hosny El Lakany, Luke Bailey and Andy White, "The Greener Side of REDD+: lessons for REDD+ from countries where forest area is increasing" (Rights and Resources Initiative, Washington, D.C., 2011).

A. Cash/monetized contributions

5. Since the 1980s, the forestry sector's contribution from roundwood production, wood processing and pulp and paper to GDP has increased to nearly $468 billion,[1] but the relative value of this output in global GDP has dropped from over 1.6 per cent to less than 1 per cent.[4] Similarly, the share of forestry products in merchandise exports has gone down from 3.5 per cent to 2.4 per cent.[4] This decline in the relative and proportionate value of forestry products is mainly attributed to fast growth in other economic sectors. It is worth noting that subnational market figures, even for wood products, have not been the subject of rigorous analysis, and all of this information is largely anecdotal.

6. These direct and formal figures show that the forestry sector is important to GDP, accounting for 0.7 per cent of GDP in 2006 in developing countries of the Asia-Pacific rim, 1.3 per cent in developed Asia-Pacific countries, 1 per cent in North America, 0.9 per cent in Western Europe and 1.2 per cent in Eastern Europe. The highest contribution to GDP in any region is found in sub-Saharan Africa, where forestry accounts for 1.8 per cent.

7. Forests play an even greater role when their contributions are considered as a percentage of exports. In North America, forestry exports accounted for 7.1 per cent of all exports in 1990 and fell to 3.8 per cent in 2006. In developing Asia-Pacific

[4] Arun Agrawal and others "Economic contributions of forests" (2013).

countries, the share dropped by 60 per cent from 3.4 per cent in 1990 to 1.4 per cent in 2006. In sub-Saharan Africa, this figure declined by 47 per cent from 3.6 per cent in 1990 to 1.9 per cent in 2006. Regions that saw increases during the same period include the region of North Africa, Western and Central Asia (0.2 per cent to 0.4 per cent), and Eastern Europe (3.6 per cent to 3.9 per cent), although the percentage of exports peaked in 2000 in Eastern Europe, at 5 per cent.[4]

8. It is important to note that cash and non-cash uses of forests are often so intertwined at the household and community levels that their contributions cannot be easily separated. The cash value of non-wood forest products (such as mushrooms, fruits, medicinal products, shea butter, honey, nuts and oil) is highly variable, by "tradable" value and rarity of the product, by location and by market access.

9. There are differences in the extent of reliance on non-wood forest products at the regional level. In Latin America and Asia, the production of such products from managed forests or farms is more common and income from these often much higher than in non-managed forests. Most African household income from such products tends to be used as a "coping strategy", as even small contributions of non-wood forest products are important in times of emergencies. Such products, including woodcarvings, rattan baskets and furniture, as well as chew sticks, which contribute more than 70 per cent of household income in Africa, are sourced mainly from craft markets, as these products have a large, organized market.[5]

B. Non-cash contributions

10. The material/cash benefits of forests generally tend to be better recognized, while the non-cash contributions of forests, including non-wood forest products, ecosystem services, tourism and cultural benefits are largely "invisible".

11. Non-cash income from forests come from forest products that household collect but consume/use in the home, or trade as barter for other goods and services, rather than selling. These may be fuelwood, timber, forest foods, medicines, fodder or fibre. Country- and region-specific studies indicate that where such data are reliably available, the non-cash economic contributions of forests to household and national economies range between three and five times the formally recognized, cash contributions.[4]

12. Women and children are most often the consumers of natural forest foods. In South Africa, 62 per cent of children supplement their diets with food sourced from natural forests, and 30 per cent rely on these foods for over 50 per cent of their diet.[4] Women benefit from the use and sale of non-wood forest products, as do older or less educated groups,[6] but their role in the non-wood forest products value chain

[5] Terry Sunderland, Susan Harrison and Ousseynou Ndoye, "Commercialisation of non-timber forest products in Africa: history, context and prospects" in *Forest Products, Livelihoods and Conservation. Case studies of Non-Timber Forest Product Systems*, Terry Sunderland and Ousseynou Ndoye, eds., vol. 2, Africa (Center for International Forestry Research, Indonesia, 2004).

[6] F. Paumgarten and C. Shackleton, "The role of non-timber forest products in household coping strategies in South Africa: the influence of household wealth and gender", *Population and Environment*, vol. 33, No. 1 (2011).

is rarely acknowledged.[7] The data on these vital values has not been systematically captured or studied.

13. A study by FAO in Uganda demonstrates that forests provide fuelwood for local energy consumption, which accounts for 40 per cent of the local economy, and the non-cash component is three times the value of the cash component (see the table below).[8]

Annual value of forest products to rural people in Uganda

	Cash		*Non-cash*		*Value of all forest products*	
Forest products by category	*(Millions of United States dollars)*	*Percentage*	*(Millions of United States dollars)*	*Percentage*	*(Millions of United States dollars)*	*Percentage*
Fuel	406	10.1	1 186	29.5	1 592	39.6
Building materials	346	8.6	655	16.3	1 001	24.9
Forest foods	241	6.0	510	12.7	752	18.7
Fibre (for ropes, baskets, mats etc.)	68	1.7	257	6.4	326	8.1
Herbal medicine	44	1.1	145	3.6	189	4.7
Timber	32	0.8	129	3.2	161	4.0
Total	**1 137**	**28.3**	**2 882**	**71.7**	**4 019**	**100**

Source: Gill Shepherd, Cornelius Kazoora and Daniel Müller, "Forests, livelihoods and poverty alleviation: the case of Uganda", paper prepared for FAO, July 2012.

C. Employment

14. Forests provide substantial levels of employment in the formal (13 million people) and informal forest sectors (45 million people). Some estimate that small- and medium-sized forest enterprises contribute more than 50 per cent of forest-related jobs in many developing countries.[9] It is important to note that the number of people who benefit from forests through employment, forest products and direct or indirect contributions to livelihoods and incomes ranges between 1 billion and 1.5 billion.[4] The data, however, remain largely unstudied.

15. Small- and medium-sized forest enterprises also provide significant employment and income opportunities for women as proprietors.[10] In Northern Ghana, 77 per cent of proprietors of such enterprises are women. At the same time, those enterprises

[7] S. Shackleton and others, "Opportunities for enhancing poor women's socioeconomic empowerment in the value chains of three African non-timber forest products", *International Forestry Review*, vol. 13, No. 2 (2011).

[8] Gill Shepherd, Cornelius Kazoora and Daniel Müller, "Forests, livelihoods and poverty alleviation: the case of Uganda", paper prepared for FAO, July 2012.

[9] Duncan Macqueen, "Supporting small forest enterprises: a cross-sectoral review of best practice" (International Institute for Environment and Development, 2008).

[10] Kwabena Nketiah and others, "Forest Connect Ghana: progress and impact" (2011) and Paul Osei-Tutu and others, "Hidden forestry revealed: Characteristics, constraints and opportunities for small and medium forest enterprises in Ghana" (2010), in *Supporting small forest enterprises: reports from the field* (Ghana) (International Institute for Environment and Development series).

are often overlooked and isolated from formal markets and thus tend to stay in the informal unassessed forest sector.[9]

D. Forests in rural development as pathways out of poverty

16. Forests provide indirect, yet reliable, pathways out of poverty and build livelihood resilience. For poor populations in remote areas, forests can gradually help move the chronically poor to the sometimes poor, and the sometimes poor to the non-poor.[11] The shift of balance between forest dependence and agriculture may often be the prelude to poverty reduction, and also correlates to the unsustainable use of forests. The intensification of agriculture and the resultant change in forest use may sometimes be a 20-year process.[12]

17. In rural households, a much greater proportion of forest income goes to support direct consumption rather than cash income. Thus the forests' primary role in rural households is to provide energy security, shelter and furnishings, medicinal use, food, nutritional security and subsequently, health. All of these aspects of forest income reduce the vulnerability of households and increase livelihood resilience. Forests' vital role in fulfilling these fundamental needs provides rural households with a secure basis from which they can further seek income-generating opportunities through agriculture, employment, investment in livestock or tree-planting, thus alleviating poverty, providing food security and overall stability.

18. In Uganda, forest-based cash income, primarily from the sale of fuelwood and charcoal (36 per cent of total cash income), house-building materials (30 per cent) and forest foods (21 per cent) is used by local communities to invest in livestock and school fees.[8] This is true of many other least developed countries and developing economies.

19. Often, rural communities find pathways out of poverty through a dual strategy that makes the best possible use of the synergies between forests and agriculture. In tropical dry forests, the pathway out of poverty is often achieved through investment in cattle, using forest products as fodder. In tropical moist forests where forest fallows are important in the agricultural cycle, fallows are often slowly enriched and turned into high-value tree crop stands over time. This has been the pattern throughout South-East Asia, as multistorey forest gardens testify, and is one of the strategies now being employed in Papua New Guinea.[4]

20. On the island of Anjouan in the Comoros, communities have converted the lower slopes of mountains almost entirely into agroforestry areas, combining such high value tree-crops as cloves and ylang-ylang with domestic fruit trees such as mango and breadfruit. A similar process has been undertaken, in a different ecological context, in the hills of Doi Mae Salong, in north-west Thailand. In each case, forest function is maintained, with a different mix of tree species, and with opportunities for poverty reduction which simultaneously maintain, or indeed improve, forest cover.[4]

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[11] For further information, see research conducted by the Chronic Poverty Research Centre, and by W. D. Sunderlin and others (2005, 2007 and 2008), as noted by Arun Agrawal in "Economic contributions of forests".

[12] Gill Shepherd, contribution to the series on "Livelihoods and landscapes strategy" of the International Union for Conservation of Nature (2012).

III. Cross-sectoral linkages

21. In recent decades, forests have been at the cross-roads between environmental, social and developmental challenges in many countries. Reconciling these often competing needs is critical as demand for food, fibre, energy and water continue to increase. Available data indicate that demand for water and energy will increase even more rapidly than demand for food and agricultural products, as incomes rise and populations move to urban areas, thereby putting more pressure on land use. To reduce pressures on forests, evidence-based cross-sectoral interventions are critical, including those related to agriculture, water, energy, transport and mining, among others. The sectors discussed below do not constitute an exhaustive list of all sectors that interact with forests.

A. Forests and agriculture

22. Since the 1960s, agriculture has predominantly been identified as a key driver of deforestation. While there have been few systematic studies on interactions between forests and agriculture, available data suggest that subsistence and commercial agriculture contribute roughly equally to deforestation in Africa and in Asia, and identify commercial agriculture as a main driver of deforestation in Latin America.[13]

23. Urbanization is associated with shifts in food consumption, as populations moving to cities tend to have higher incomes and consume more processed foods and animal products than rural dwellers.[14] Such changes in consumption encourage large-scale commercial agricultural production in rural areas, spurring forest conversion to pastures for livestock and cropping.

24. There is a growing debate on the merit of increasing agricultural productivity through agricultural intensification, and its impacts on forests. While higher agricultural productivity has been important in some developing countries to meet food demand, increased financial returns from agricultural land may provide incentives for further land clearing and deforestation.[15] Over the past two decades, a number of developing countries, including China, India and Viet Nam, have expanded national forest areas, largely as a result of a combination of increases in agricultural productivity, greater reliance on international trade in agricultural products, and by setting aside degraded marginal lands for reforestation.[16]

25. Globally, the task of understanding the interaction between forests and agriculture has been further constrained by the fact that data on agriculture and forests are maintained by separate ministries in most countries. For example, the literature on total factor productivity growth in agriculture does not take into account the environmental consequences of productivity growth, whether on forest land conversion or the impact on water and soils.

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[13] Uma Lele and others "Changing roles of forests and their cross-sectoral linkages in the course of economic development" (2013).

[14] Ruth De Fries and others, "Deforestation driven by urban population growth and agricultural trade in the twenty-first century", *Nature Geoscience*, vol. 3, No. 3 (2010).

[15] Karine Belna and Romain Pirard, "Agriculture and deforestation: state of knowledge and the gap with REDD-plus activities", in *Forest Policy and Economics* (forthcoming).

[16] Eric F. Lambin and Patrick Meyfroidt, "Land use transitions: socio-ecological feedback versus socioeconomic change", *Land Use Policy*, vol. 27, No. 2 (2010).

B. Forests and water

26. Forested catchments provide three quarters of fresh water used for household, agricultural and industrial needs.[17] Deforestation has direct impacts on the hydrologic cycle and has been linked to the increased occurrence of floods, soil erosion, sediment concentration and water pollution, among others. As forested catchments have competing needs from households, agriculture and industries, a key challenge is to maximize the wide range of multisectoral forest benefits without detriment to water resources and ecosystem functions. Many countries have begun to develop integrated water resource management plans at the watershed or river basin levels.

27. Payments for watershed service schemes, a subset of payments for environmental services, have gained popularity as a tool to improve the efficiency of watershed management in several middle income countries, including in China, Costa Rica and Mexico.[13] Many payments for watershed service schemes include forest conservation, regeneration or plantations by providing an incentive to upstream land users to adopt practices that ensure the supply of environmental services to downstream land users.

28. Climate change is altering the role that forests play in regulating water flows and influencing the availability of water resources. In semi-arid areas where climate change threatens water resources, large-scale forest planting has the potential to exacerbate water shortages. This is an important factor as there is an increased focus on planted forests for carbon sequestration, renewable energy, and wood supply alternatives to natural forests, including landscape restoration.

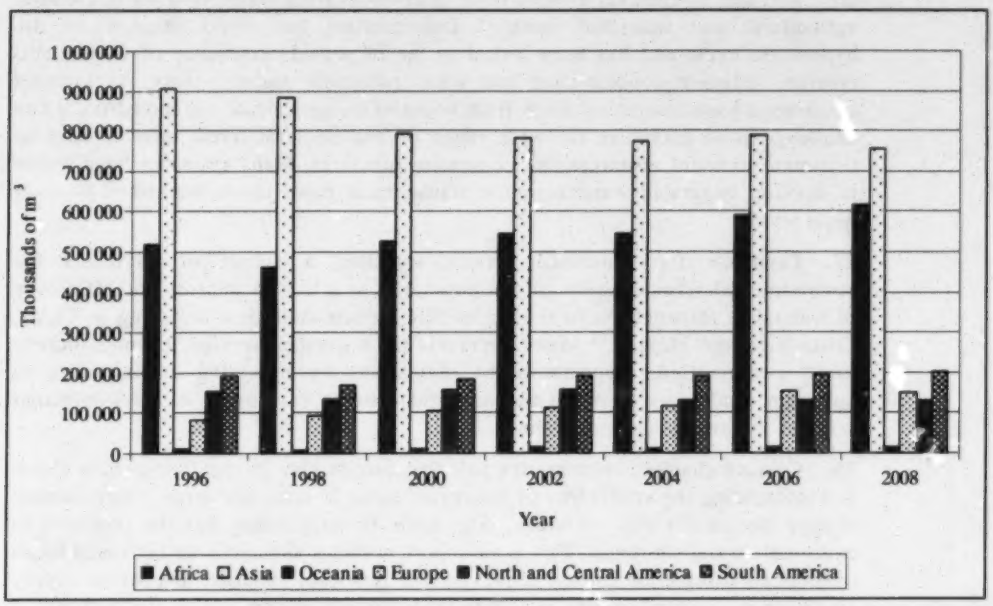
29. Existing climate data do not generally include microclimatic effects and the role of forests and trees. To better understand regional climate drivers, further data and information is needed on how specific land cover change, including in forest lands, affects the water cycle.

C. Forests and energy

30. Globally, over 3 billion people, approximately 43 per cent of the world's population, are dependent on fuelwood.[13] Regions with the greatest incidence of poverty, in particular in sub-Saharan Africa and Asia, are the most dependent on fuelwood (see figure 2). Developing countries account for nearly 90 per cent of fuelwood and charcoal consumption, and wood is the primary source of energy for cooking and heating in those countries. The differences among countries in terms of dependence on fuelwood may be explained by a combination of factors, including: (a) availability of other energy sources; (b) higher standard of living; (c) reduced share of population living in poverty and hunger; (d) increased wages and employment; and (e) increased opportunity costs for women's labour, as women are the primary collectors of fuelwood.

[17] Andreas Fischlin and others, "Ecosystems, their properties, goods, and services", in "Climate Change 2007: Impacts, Adaptation and Vulnerability", contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (2007).

Figure 2
Fuelwood consumption by region (1996-2008)



Source: Data adapted from FAO, *State of the World's Forests* (1997-2011).

31. Given that 95 per cent of all staple foods need to be cooked to be consumed, an affordable and sustainable supply of energy for cooking is crucial. Nearly 3 billion people in the developing world use traditional cookstoves and open fires to cook.[18] Women and children are disproportionately affected, both in terms of their health from exposure to air pollution and their security when searching for biomass in insecure areas. The practical need for cooking fuel is often underestimated by donors and aid agencies when providing food supplies (e.g., rice) as aid.

32. As forest plantations for energy production become more common, there are increasing concerns about the trade-offs related to bioenergy use, particularly its effects on forests, carbon dioxide emissions and indirect land use effects. Competition over land for food, fibre and fuel is likely to increase, and research has been interpreted by some as indicating that the production of bioenergy will contribute to significant deforestation and increased food prices.

D. Forests and transport

33. Transportation infrastructures, particularly roads, directly and indirectly contribute to deforestation. The construction of roads may result in forest clearance, while the roads themselves may contribute to deforestation by opening up forests to

[18] World Bank, "Household cookstoves, environment, health, and climate change: a new look at an old problem" (Washington, D.C., 2011).

agriculture or logging, facilitating human settlement in previously uninhabited areas or increasing access to the forest for non-wood forest products.[19]

34. Forest clearance for transportation infrastructures can result in associated negative impacts on biodiversity, ranging from increased erosion to edge effects. When roads cut across previously forested landscapes, they fragment the landscape, resulting in smaller patches that produce edge effects, which results in changes in community structure, declines in biomass and negative impact on wildlife and other species.[20]

35. While roads contribute to deforestation, the construction of roads is often promoted for agricultural development, rural development and poverty alleviation. The placement of rural roads, including feeder roads, can have positive effects on rural incomes.[21]

36. Different transport options need to be considered to reduce the impact of the transport sector on forests. For example, rail transportation can reduce the impact on forests by allowing a greater control of access to the adjacent land by limiting the construction of new secondary roads.

E. Forests and mining

37. Mining in forest areas often accelerates deforestation and forest degradation. Forests and mineral rich areas tend to overlap, resulting in the need to clear forests for mining purposes. Mining results in forest and land conversion, habitat fragmentation and associated negative biodiversity effects. According to available data, it is estimated that 75 per cent of active mines and exploration areas occur in areas of high conservation value and high watershed stress.[22]

38. Mining also has a significant impact on forests by altering forest type. The clearing of edge forests for mining converts adjacent interior forest to edge forest, thereby contributing to the loss of interior forest, which alters the ecological composition, functions and structure of forests.

39. Mining often opens up forests to human activities through the construction of roads and leads to erosion, facilitates logging activities, and contaminates soil, groundwater and surface water. Mining can thus indirectly contribute to the loss of non-wood forest products and affect the livelihoods of local populations who depend on the forests for food, medicine and craft and construction material.

40. Forest regeneration following mining tends to be slower than regeneration following other land uses, as mining often causes higher levels of disturbance by turning over the soil and eliminating seeds, roots and tree saplings.

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[19] Alexander S. P. Pfaff, "What drives deforestation in the Brazilian Amazon? Evidence from satellite and socioeconomic data", *Journal of Environmental Economics and Management*, vol. 37, No. 1 (1999).

[20] David Wilkie and others, "Roads, development, and conservation in the Congo basin", *Conservation Biology*, vol. 14, No. 6 (2000).

[21] Kenneth M. Chomitz and David A. Gray, "Roads, Land Use, and Deforestation: A Spatial Model Applied to Belize", *World Bank Economic Review*, vol. 10, No. 3 (1996).

[22] Marta Miranda and others, "Mining and Critical Ecosystems: Mapping the Risks" (World Resources Institute, 2003).

F. Forests and health

41. Forests represent natural pharmacies with rich stores of plant, animal and microbial material with known or potential medicinal values. In the United States of America, half or more of prescribed medicines originate from natural sources,[23] and 70 per cent of all new drugs introduced in the United States in the past 25 years have been derived from natural products.[24]

42. The World Health Organization estimates that between 65 per cent and 80 per cent of the world's population rely on naturopathic or homeopathic medicines that derive from forests as their primary form of health care. One of the advantages of forest products is that they are often freely accessible or affordable sources of medicine for populations that might otherwise be unable to afford medicine or lack access to formal health-care services.

43. Deforestation and forest fragmentation also affect the emergence of new infectious diseases, owing to increased human contact with wildlife.[25] For example, in the United States, increased risk of Lyme disease has been attributed to deforestation and forest fragmentation in the north-east of the country.[26] Deforestation can also lead to the replacement of benign vector species with a more effective disease vector. In parts of South-East Asia and the Amazon, the *Anophelese* mosquito species have replaced benign native species, resulting in more virulent strains of malaria following deforestation.[23] The connection between forests, altered landscape and infectious diseases is not only of public health concern, but also associated with significant economic consequences. The outbreak of such communicable diseases carries high human and economic costs.

44. The relationships between forests and disease are complex and targeted, strategic management of forests and landscape can help prevent the spread of infectious diseases. In Italy, for instance, reforestation to reclaim swampland helped control malaria in the early twentieth century.[27]

IV. Key trends affecting the future of forests

45. Trends in the global economy, demography and climate have direct implications for the contributions of forests to economic development. Rapid economic change and movement of capital and labour across boundaries create changing patterns of supply and demand, and consumption and production, which in turn affect forests. Demographic changes, not just in the rising number of people, but also through migration, shifts between rural versus urban location, and the age and class composition of people, will shape the forests of the future. In addition, climate change mitigation and adaptation actions are inextricably interlinked with forests, from changes in temperature and precipitation, to how forests can help offset emissions. The interplay of these forces has brought the issue of resource scarcity to the forefront.

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[23] Eric Chivian and Aaron Bernstein, eds., *Sustaining Life: How Human Health Depends on Biodiversity* (Oxford, Oxford University Press, 2008).

[24] David J. Newman and Gordon M. Cragg, "Natural Products as Sources of New Drugs over the last 25 Years", *Journal of Natural Products*, vol. 70, No. 4 (2007).

[25] Walter V. Reid and others, "Millennium Ecosystem Assessment" synthesis report (2005).

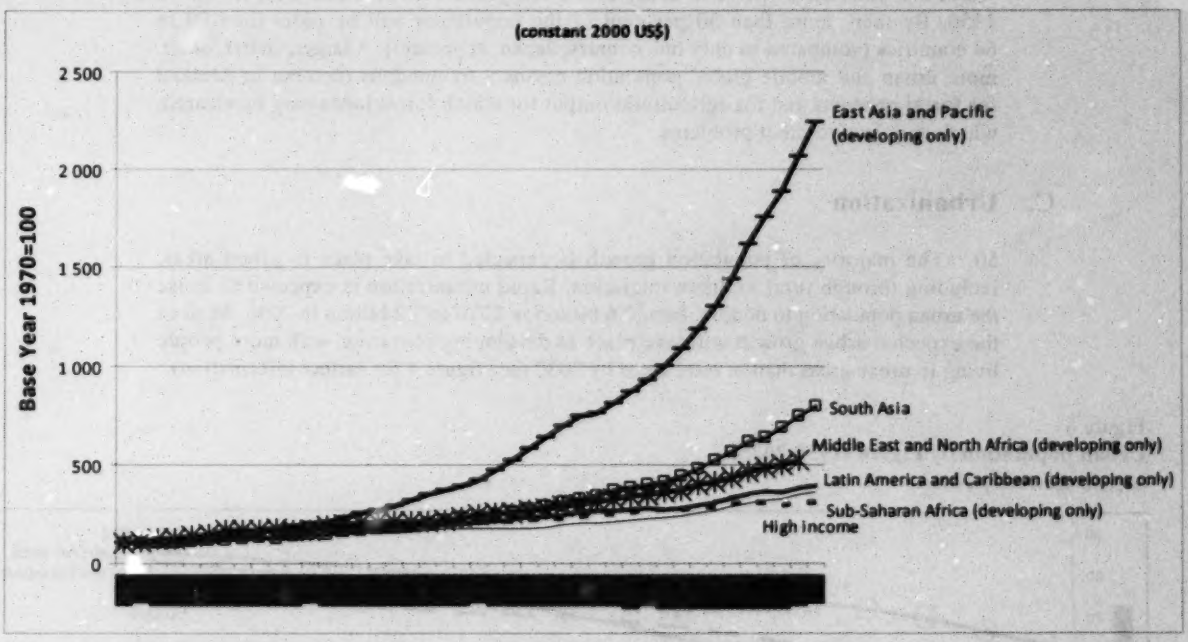
[26] Eeva Karjalainen and others, "Promoting human health through forests: overview and major challenges", *Environmental Health and Preventive Medicine*, vol. 15, No. 1 (2010).

[27] FAO, "Forests and human health", *Unasylva*, vol. 57, No. 224 (Rome, 2006).

A. Global economic growth

46. During the period from 1990 to 2010, the world experienced accelerated global economic growth and increased trade volumes, including in agriculture and forest products, despite the economic downturn that started in 2008 (see figure 3). This global economic growth was driven by developing countries in all regions. Such economic growth, together with rising per capita income and a global population predicted to reach 9 billion by 2050, has direct implications for the pressure on natural resources, including forests.

Figure 3
Global GDP growth by region (1970-2011)



Source: World Bank, *World Development Indicators and Global Development Finance* (Washington, D.C., 2011).
Note: data for the Middle East and North Africa is not available for the year 2011.

47. Economic growth also drives new investment in infrastructure development in developing countries, particularly the contiguous tropical forest countries of the Amazon and the Congo Basins and in South-East Asia. For example, mining and gas investments related to roads and pipelines alone are estimated to be worth upwards of $5 trillion to $10 trillion.[28]

[28] Ian Bannon and Paul Collier, eds., *Natural Resources and Violent Conflict: Options and Actions* (Washington, D.C., World Bank, 2003); Johanna Carstens and Gavin Hilson, "Mining, grievance and conflict in rural Tanzania", *International Development Planning Review*, vol. 31, No. 3 (2009); Denis M. Tull, "China's engagement in Africa: scope, significance and consequences", *Journal of Modern African Studies*, vol. 44, No. 3 (2006).

B. Demographic changes

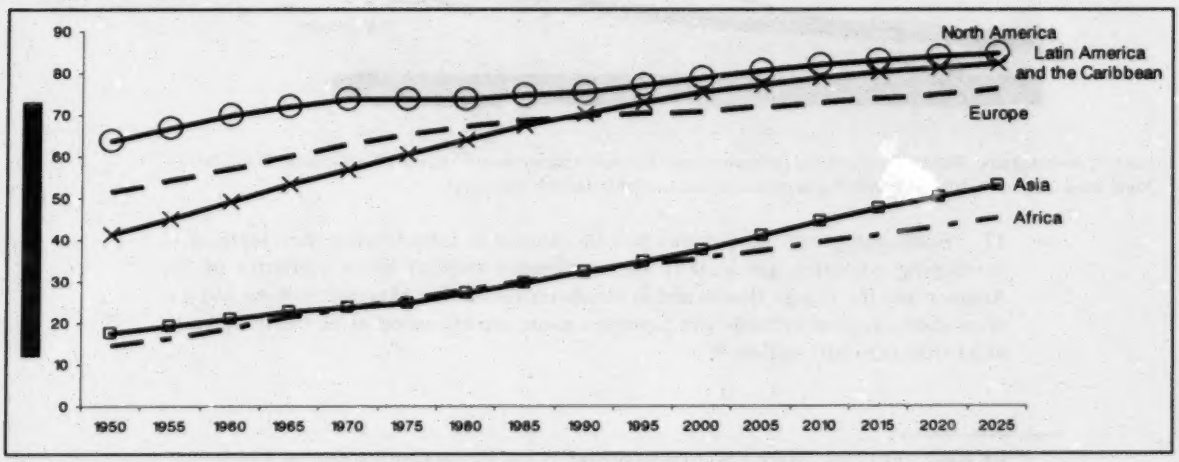
48. Demographic changes are creating more demand and pressure on forests and natural resources in general. The increase in the global population over the past half century has resulted in changes in the demographic structure in terms of age and class, as well as settlement and migration patterns that directly affect forests. The global population is expected to increase by up to 3 billion in the next three decades, with much of this increase occurring in developing countries.[29]

49. In addition to rapid growth, there are other demographic dynamics at play. 2009 was the first time in human history that the number of people living in cities edged above rural populations. It is estimated that by 2030, 60 per cent of the world's population will live in urban areas, compared with less than 30 per cent in 1950. By then, more than 30 per cent of the population will be older than 80 in 64 countries (compared to only one country, Japan, at present). A larger, richer, older, more urban and mobile global population means a tremendous increase in demand for forest products and for agricultural output for which forest lands may be cleared, which may lead to other problems.

C. Urbanization

50. The majority of population growth is expected to take place in urban areas, including through rural to urban migration. Rapid urbanization is expected to cause the urban population to double, from 2.6 billion in 2010 to 5.2 billion in 2050. Most of the expected urban growth will take place in developing countries, with more people living in urban areas than in rural areas by 2030 (see figure 4 for further information).

Figure 4
Urban population by region (1950-2025)
(as percentage of total population)



Source: United Nations, *World Urbanization Prospects: the 2011 revision* (2012).

[29] United Nations, *World Population Prospects* (2011).

51. As urbanization accelerates globally, forests increasingly contribute to meet growing urban demand for food, water and environmental services. Urbanization and income growth have been associated with increased food demand and changing consumption patterns, typically increasing caloric consumption and shifting to crops and products of higher value, which are often more water-consuming, including livestock, fisheries, fruits and vegetables.

52. In many developing countries, forests also provide vital energy sources to the growing urban population. For example, wood represents 80 per cent of domestic fuel in Nigeria and 3.5 million inhabitants in Abuja depend on wood extracted from natural forests, forest plantations and other available sources in urban and peri-urban areas within a radius of 80 km to more than 100 km.[30]

53. The contributions of urban forests and trees outside forests to both physical and mental health are less frequently captured. Visits to forests improve human health by providing physical exercise opportunities and reducing mental stress. Studies have shown that individuals who spend time in forests can recover from fatigue and focus better, as well as showing improvements in mood and stress level.[26] Some countries have explicitly encouraged the link between forests and physical and mental health through specific programmes. [31]

D. Food security

54. Forests directly contribute to food and nutritional security. In Uganda, rural communities rely on forest foods to provide much needed protein, vitamins and minerals otherwise lacking in the carbohydrate-rich farm diet. Herbal medicines from forest products alone are worth $189 million annually to rural Ugandans, representing nearly 60 per cent of the national health-care budget. Forest food accounts for 19 per cent of forest income and for 8 per cent of all food consumed and sold in Uganda, including that from agricultural production.[8] However, relevant global projections have yet to be made.

55. At the regional level, high rates of global poverty and food insecurity are primarily concentrated in South Asia and sub-Saharan Africa. In sub-Saharan Africa and low-income countries in Asia, deforestation pressures stem from smallholder farming and fuelwood needs. In comparison, in Latin America and other parts of Asia, the pressure on forests comes mainly from commercial farming.

E. Forests and climate change

56. Forests store large amounts of carbon through trees, understorey vegetation and soils. Globally, forests contain more than 650 gigatons of carbon, greater than the amount of carbon in the entire atmosphere.[32] Deforestation and forest degradation is

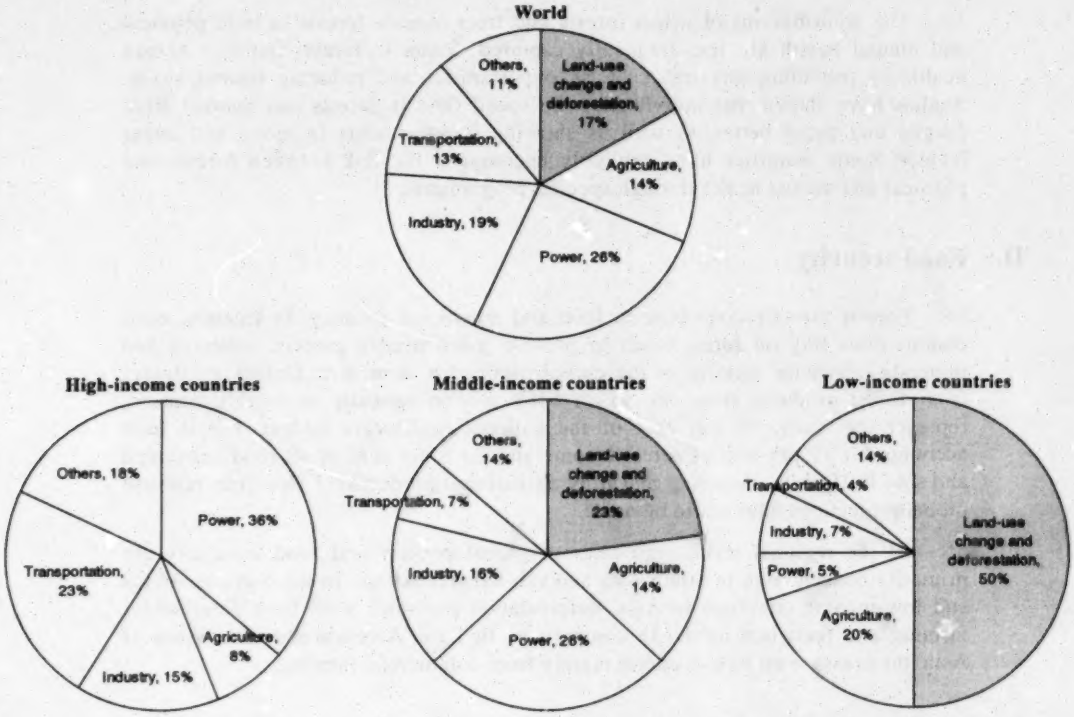
[30] FAO, "Urban and peri-urban forestry in Africa: the outlook for woodfuel", Urban and peri-urban forestry working paper No. 4 (Rome, 2012).

[31] The Green Gym programme in the United Kingdom of Great Britain and Northern Ireland encourages physical activity through environmental and gardening work. Japan has designated specific forests as forest therapy bases in recognition of their relaxing effects on people. See also the study by Eeva Karjalainen and others (2010).

[32] FAO, *Global Forest Resources Assessment 2010* (Rome, 2011).

estimated to contribute 17 per cent of global greenhouse gas emissions.[33] The estimated average global rate of forest carbon depletion is 1.6 gigaton per year or about 0.25 per cent of total forest carbon. As illustrated in figure 5 below, the level of greenhouse gas emissions from land-use change and deforestation varies when compared with different stages of development. On the global level, land-use change and deforestation accounts for 17 per cent of total greenhouse gas emissions. However, this percentage goes up for middle- and low-income countries (23 per cent and 50 per cent, respectively).

Figure 5
Deforestation and land-use change in greenhouse gas emissions — development comparison



Source: World Bank, *World Development Report 2010: Development and Climate Change* (Washington, D.C., 2010).

57. At the same time, climate change has significant effects on forests, including its impact on the extent of forest resources, biological diversity, forest health and vitality and productive and protective functions of forest resources. Depending on geographic location, original climatic conditions, species diversity and human activities, changes in temperature and precipitation also affect the frequency and

[33] World Bank, *World Development Report 2010: Development and Climate Change* (Washington, D.C., 2010).

intensity of forest fires and outbreaks of pest infestations, extreme weather conditions, and alterations in the populations of plant and animal species.[34]

58. These climate change impacts adversely affect the productivity of land and water resources, particularly in tropical regions. It could also ultimately lead to a shift in the production and processing of forest products from tropical countries to temperate countries (see E/CN.18/2009/4).

F. Forests and natural disasters

59. The impact of natural disasters on economies and societies is immeasurable. There is growing recognition of the linkages between sustainable forest management and disaster risk reduction. Forest resources and services play an important role in reducing human vulnerability to natural disasters. Forests stabilize slopes to prevent landslides, protect coastal communities against tsunamis and restore wetlands to maximize flood regulation while safeguarding biodiversity and livelihoods.[35]

60. Recent studies revealed that coastal forests can contribute to the mitigation of the impact of tsunamis.[36] For example, the assessment of the impact of the Indian Ocean tsunami of 2004 provided evidence that the clearing of mangrove forests increased the exposure of coastal communities to the disaster. In Viet Nam, the mangrove forest along approximately 200 km of coastline has recently been reforested in an effort to protect local communities against waves, wind and typhoon damage.

G. Competing pressures

61. Considering the above factors of increasing global demands for food, water and energy and the dwindling supply of natural resources, we are faced with a scenario of competing pressures, which could raise the prices of land and agricultural crops and increase incentives for more land for commodities.

62. Agricultural commodities account for more than 30 million hectares of new land under cultivation since the 1990s, much of the expansion occurring on forested lands. Commodity prices have risen by more than 50 per cent since the beginning of the century, despite a recession (see figure 6). The sustainability of forests and the economic viability of forest products will be influenced in large measure by how Governments, producers and consumers manage the future expansion of agricultural commodity production.

63. Tropical landscapes in which agriculture and forests meet present key conservation and development challenges. On the one hand, the conservation of remaining tropical forests in these landscapes is necessary to maintain biodiversity, mitigate carbon emissions from deforestation, maintain forest-based resources for local livelihoods and sustain key ecosystem services. However, increased food

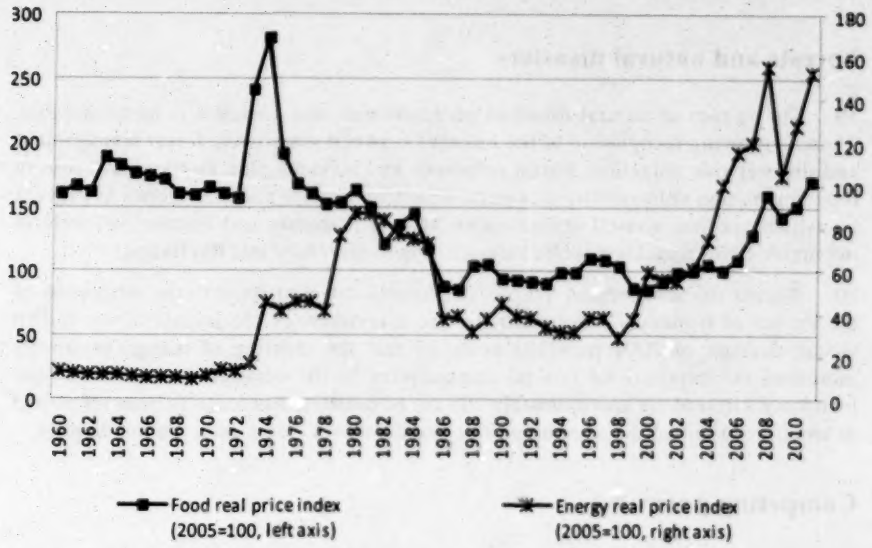
[34] FAO, "Forest Management and Climate Change: a literature review", Forests and Climate Change Working Paper 10 (Rome, 2012).

[35] United Nations Environment Programme, "Opportunities in environmental management for disaster risk reduction: recent progress", a practice area review in contribution to the Global Assessment Report on Disaster Risk Reduction (2012).

[36] Keith Forbes and Jeremy Broadhead, "The role of coastal forests in the mitigation of tsunami impacts" (Rome, FAO, 2007).

production is needed to feed a larger global population, provide subsistence and income-generating opportunities for agriculture-based local livelihoods, and support trade in agricultural commodities.

Figure 6
Food and energy real price indices (1960-2011)



Source: Brian D. Wright, "The economics of grain price volatility", *Applied Economic Perspectives and Policy*, vol. 33, No. 1 (2011).

64. The quest for more food, energy and resources driven by demographic changes and resource scarcity has resulted in a change in the ownership and control of massive areas of land, close to perhaps 100 million hectares, in developing countries, especially in sub-Saharan Africa.

V. Challenges in enhancing economic contributions of forests

65. In many cases, it is not the monetary wealth that forests can provide but the welfare they offer that is so important. Many of the non-wood forest products case studies show how profoundly forests underpin local livelihoods. They are not just for hard times, but are of daily value for people, regardless of gender, class, geography and income levels. For all rural women and for most rural men apart from the very wealthiest, the livelihood and subsistence needs drawn from forests are far more important than their wood values.

66. If the contribution of the forestry sector to GDP alone is in the neighbourhood of $468 billion per year, it is projected to be two to three times greater for benefits that are not included in GDP figures. While the total number of people employed in the formal forestry sector is around 13 million, the number of people employed in the informal sector for forests is closer to 45 to 50 million. These indicative

numbers for the relationship between the size of the formal versus the informal forest sector are sufficient to indicate that the informal sector is far larger than the formal, cash-valued forest sector.

67. Forests contribute to the ecosystem services that people depend on, such as climate regulation and water purification, and it remains a challenge to place a monetary value on these vital services. Different economic valuation strategies,[37] such as restoration cost method or constructed market techniques based on "willingness to pay", estimate the economic value of ecosystem services from forests to be trillions of dollars. However, enhanced analysis and data on these values are needed.

68. Data on various aspects of forests in relation to other social, economic and institutional indicators are inconsistent and cannot be compared across countries and regions. But even if the available data allows only a blurry picture, the information is sufficient to infer that non-cash forest benefits are far larger than those derived from high-visibility forest products such as timber, paper and pulp.

69. Therefore, better systematic forest data is needed, particularly on the non-cash and informal benefits forests generate through non-wood forest products. Because the value of such products is likely to be two to three times greater than that of products exchanged for cash, and because those products are critically important as buffers during periods of scarcity and as nutrition for populations who are cash poor, better information on them is needed to manage their supply and distribution more effectively, as well as policies which recognize and support these functions.

70. Emerging data collection technologies based on mobile devices and new methods to gather information could be mobilized to create a better picture of the distribution of non-cash benefits from forests in space and time, as well as across different social groups. Collaboration across different government and multilateral agencies to integrate datasets and create a more systematic picture of the role of forests is vital.

71. Such multipronged efforts are critical to improved measurement, calculation and analysis of the economic contributions of forests. Good forest governance is a critical enabler for sustainable forest management and is dependent on political commitment, accurate data and information on forest resource changes, and effective enforcement of forest laws and regulations, among other considerations. Thus, advancements in information and knowledge are essential for better and more efficient governance of forests, which will in turn contribute to changing laws and policies.

VI. Key opportunities for forests and economic development

A. A landscape approach to land-use planning

72. Integrated approaches to landscape management aim to increase synergies among multiple land-use objectives where the role of forests and trees, and the goods and services they provide, are better understood by all stakeholders and

[37] For details, see the report of the Secretary-General on scientific research, forest assessment and development of criteria and indicators for sustainable forest management (E/CN.17/IPF/1996/7).

viewed from a broader perspective, encompassing forests and forestry along with agricultural productivity, soil protection, water supply and distribution, biodiversity conservation, and other values. Planning on a landscape level will matter far more in the future, as the complexity of land-use changes increases to meet growing demand for food, energy and water; while balancing these needs with ecosystem services. A landscape approach takes into account different areas of the natural and human, and urban and rural landscape, which are interconnected and driven by common processes.

73. Cross-sectoral policies that encourage sustainable forest management and incorporate social, environmental and economic aspects, including livelihood requirements, are essential to recognizing the non-material benefits of forests. It has been reported that over 50 countries already have inter-institutional mechanisms for cross-sectoral cooperation to achieve sustainable forest management (see E/CN.18/2013/2). For instance, policies that recognize the role of forests in providing food and protein sources can address sustainable forest management and food security at the same time.

74. National forest programmes can serve as a cross-sectoral platform to integrate other sectors such as agriculture and water into forestry programmes. For example, the Programme on the Sustainable Development of the Rhine, a transboundary initiative, adopted afforestation and forest conservation measures to facilitate water retention and prevent floods in nearby downstream areas (see E/CN.18/2011/5). In its national report to the tenth session of the Forum, Israel documents the launch by the Israeli Forest Service, Keren Kayemeth LeIsrael, of a policy that encouraged the adoption of sustainable forest management practices for planted forests and developed methods to harvest run-off water for planted forests.

75. National forest programmes can also provide a mechanism for cross-institutional coordination and stakeholder engagement. In its national report to the tenth session of the Forum, Nigeria explains that the national forest programme has been used as the key entry point for establishing contacts among government departments, donors and stakeholders and to build a cross-institutional platform for harnessing forest resources for national economic development and poverty alleviation.

76. A landscape approach to understanding land transitions can help identify specific opportunities for enhancing social, economic and environmental benefits. In New York, the city government was faced with a choice between building a new water filtration plant for drinking water at the cost of between $6 billion and $8 billion or paying landowners in the Catskills $1 billion to protect watersheds; the city government chose to pay for the environmental services of protecting the watershed.[38]

B. Restoration: the role of trees outside of forests

77. The Global Partnership on Forest and Landscape Restoration[39] estimates that nearly 2 billion hectares of land, half the of the world's official areas of forest, offer

[38] See the report of the Biodiversity and Ecosystems Panel of the President's Committee of Advisors on Science and Technology, "Teaming with Life: Investing in Science to Understand and Use America's Living Capital" (1998).

[39] The Global Partnership on Forest and Landscape Restoration has 19 partner organizations and is supported by the 13 Governments worldwide.

potential for restoration. Increasingly, such areas will be where most forests will be located and, in parallel, where more people will be located, therefore their improved and sustainable management is essential.

78. Large areas of so-called degraded forestlands can become more productive and deliver higher levels of goods and services than they do at present. Agroforestry and farming systems present opportunities for more intensive planting and use of tree products for food, feed and other commodities. They also provide scope for building small enterprises, backed by associated research and policy, to support improved production, management and post-harvest processing and marketing, and ultimately to enhance benefits for the poor and disadvantaged.

79. Trees in semi-arid areas and drylands, by roadsides, on farms, and in urban areas provide many of the services and economic benefits that people need from forests: firewood, fodder, timber, emissions reduction and other services. Relieving pressure on contiguous areas of forests can then help support other functions that such forest areas provide, such as protection of biodiversity, controlling erosion and maintaining the water cycle. The mosaics of cropland, pastures, agroforestry, tree plantations and remnants of natural forests are increasingly likely to play major roles in meeting human and social needs for wood and other functions of forests.[40]

C. Information and data management

80. A critical obstacle in demonstrating economic contributions of forests is the absence of data and information on the full scope and value of forest benefits. Current forest-related data does not take into account economic activities and benefits from forests that are (a) not exchanged for cash, (b) in the informal sector, and (c) not recognized by forest, economic development, trade or finance authorities. Improvements in the systematic collection and analysis of such data are necessary if the full extent of the economic contributions from forests are to be recognized.

81. Systematic data on the full extent of forest benefits and how these benefits contribute to poverty reduction will help decision makers recognize the key economic contributions of forests. Both developing and developed countries often lack the information about how forests are linked to other sectors such as agriculture, energy and water. More effective use and decision-making based on forest-related data, however, depends on the capacity to connect biophysical data with social, institutional and policy data.

82. Valuation methodologies that reflect forest goods and services represent yet another avenue for recognizing the material and non-material benefits of forests. Similarly, national accounting that incorporates data on forest products related to environmental and recreation services and fodder, food, fuel and medicinal values would facilitate better documentation of the full value of forests, and thus contribute to sustainable management in its full sense.

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[40] Center for International Forestry Research, World Agroforestry Centre, Bioversity International and International Center for Tropical Agriculture, "Forests, trees and agroforestry: livelihoods, landscapes and governance — proposal", February 2011. Available from www.cifor.org/fileadmin/fileupload/crp6/CRP6_7feb_lowres.pdf. See also Janet Ranganathan and Craig Hanson, "A new approach to feeding the world", September 2011. Available from http://insights.wri.org/news/2011/09/new-approach-feeding-world.

83. The World Bank Group's report on the Environment Strategy 2012-2022, "Towards a green, clean, and resilient world for all" highlights the need to take into account natural capital and the value of ecosystem services, including for oceans and marine biodiversity, in economic decisions. To do so, it will be necessary to incorporate these values in national accounting systems for capturing natural resource capital.[41]

84. A study by the Organization for Economic Cooperation and Development (OECD), "OECD environmental outlook to 2050: the consequences of inaction", highlights some of the key research priorities for addressing ecological, biophysical and technological knowledge gaps. These include such areas as soil carbon, strategies for adaptation to climate change, sustainability and drivers of wood supply, short rotation coppice and rural land use, non-forest wood supply and wood for energy. It is important to note that the reporting guidelines for financing flows to forestry as determined by OECD are narrower than the scope of the work of the Forum on forest finance.

85. Better forest data and information could ultimately inform consumers and businesses about the sourcing of commodities and raise awareness about zero-deforestation commodities and sustainably produced products, as well as relevant procurement policies.

86. Some of the biggest consumer goods companies have already voluntarily adopted mandatory requirements for sustainable production and responsible sourcing for a range of forest-risk commodities, such as palm oil, soya, beef and cocoa. Unilever, the world's largest buyer of palm oil, has a commitment to the sustainable sourcing of all its agricultural raw materials by 2020 and will purchase all palm oil from certified sustainable sources by 2015. Nestlé has committed to ensuring that all its raw materials sourced in forest areas have not led to deforestation. The Consumer Goods Forum, which represents companies with annual revenues over $3 trillion, has pledged to help achieve zero net deforestation by 2020.

87. Building a knowledge base of the full extent of forests' contributions to economic development requires rethinking production-centred values and benefits through a more holistic approach, which takes into account the full range of social, economic and environmental services that forests provide. It also requires more effective measurement of the value of forests and the reflection of those values across sectors and institutions. Further details, including relevant conclusions and recommendations, are contained in the corresponding report of the Secretary-General (E/CN.18/2013/5).

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[41] The System of Environmental-Economic Accounts, which was adopted by the Statistical Commission, provides an internationally agreed method, on par with the current System of National Accounts, to account for such material natural resources as minerals, forests and fisheries. Wealth Accounting and the Valuation of Ecosystem Services, a partnership facilitated by the World Bank, is helping to implement natural capital accounting based on the System of Environmental-Economic Accounts.